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BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 2002-01

EXHIBIT 24R.0 (DMH-RT)

BP WEST COAST PRODUCTS, LLC

BP CHERRY POINT COGENERATION
PROJECT

APPLICANT'S PREFILED REBUTTAL TESTIMONY

DAVID M. HESSLER, P.E.

Q. Please reintroduce yourself to the Council.

A. My name is David Hessler, and my business address is 7521 Virginia Oaks Drive,
Suite 240, Gainesville, Virginia 20155.

EXHIBIT 24R.0 (DMH-T)

DAVID M. HESSLER

REBUTTAL TESTIMONY - 1

[/24R.0(DMH-RT).DOC]

PERKINS COIE LLP
1201 Third Avenue, Suite 4800
Seattle, Washington 98101-3099
(206) 583-8888

1 **Q. What testimony are you responding to?**

2
3 A. I am addressing the prefiled direct testimony filed by Paul Wierzba, witness for
4 Whatcom County.
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9 **Q. Apart from this testimony, have you reviewed any other subsequent materials?**

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11 A. Yes. I have looked over the additional information relating to the recent background
12 level survey that was provided by David Grant (letter dated November 20) in
13 response to a request submitted on November 13, 2003.
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19 **Q. Would you please remind the Council of your experience related to power plant noise assessments?**

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21 A. In addition to a degree and certification as a mechanical engineer, my career for the
22 last twelve years has been dedicated almost exclusively to the acoustical design and
23 field testing of power plants. A very significant portion of my time is spent at the
24 plants themselves carefully measuring the installed performance of each individual
25 piece of equipment as well as the overall far field noise levels produced by each
26 facility under all types of weather and operating conditions. Of the literally hundreds
27 of plants I have designed and/or tested, the type of facility I am most familiar with
28 and have visited most often is a combined cycle facility powered by General Electric
29 7FA combustion turbines; i.e. the type of facility proposed at Cherry Point. The
30 analyses and assessments I have performed thus far on the project are based on
31 extensive first-hand experience with the actual noise emissions of this particular kind
32 of plant.
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BACKGROUND NOISE LEVELS

Q. Dr. Wierzba concludes that the Cogeneration project will result in a much greater change in the noise level at receptors to the north of the facility compared to the background sound levels measured in the recent (Oct. 28 to Nov. 5) field survey carried out by Whatcom County. What is your assessment of this additional background monitoring data?

A. The objective of all ambient noise surveys is to establish what background levels are consistently present at each receptor location and available to mask or minimize the perceptibility of additional noise from a new source. Ideally, such surveys would cover extensive periods of time but, as a practical matter, they are usually limited to a few days or less. Obviously, the more data that are available the better and I am grateful to the County for taking these additional measurements.

It is immediately clear that the new background measurements show significantly lower A-weighted, L90 levels (the statistical sound level that is exceeded 90% of the measurement period) than I had recorded in April. The reason for these lower levels in the recent survey was somewhat puzzling until I reviewed the wind speed and direction data collected at the refinery weather station on the days of the County's survey (see Exhibit 24R.1). Essentially throughout the entire survey period, and certainly on the nights when the A-weighted sound level was measured at each location, the wind was blowing from the ENE; i.e. generally from each measurement location towards the refinery. These data are significant in that they point up an

1 interdependence between the wind direction and the background sound level at the
2
3 receptors, something that was not immediately obvious from my survey results.
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6 In general, when the wind blows from the ENE, background sound levels at the
7
8 receptors to the north of the project site are relatively low compared to when the wind
9
10 blows from the other principal direction, the SSW.
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14 **Q. Does this apparent relationship between wind direction and background level**
15 **have any relevance to Dr. Wierzba's conclusions about potential impacts at the**
16 **receptors to the north of the site?**
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20 **A.** Most definitely. He is comparing facility noise with a 6 to 7 mph SSW wind
21
22 (blowing from the facility towards the receptors to the north) to a background level
23
24 that is occurring under ENE winds. These are nearly opposite wind conditions that
25
26 cannot occur simultaneously. In order to predict noise impacts from the facility that
27
28 could actually occur, the background measurements and the modeled predictions need
29
30 to have the same wind conditions. By comparing the low background conditions to
31
32 the project noise predictions, Dr. Wierzba has dramatically overstated the likely
33
34 effect of the project on noise levels.
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38 **Q. What about the very low magnitude of the background levels recorded in the**
39 **latest survey -- are the reported levels of 32 dBA at Blaine Road and 34 dBA at**
40 **Bay Road appropriate values to use as design bases for the plant, if only under**
41 **ENE wind conditions?**
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1 A. As indicated in Exhibit E of Dr. Wierzba's testimony, the "observed levels,
2 particularly the A-weighted values, towards the northern points of reception were
3 considerably quieter than expected". I would have to say I agree with that sentiment.
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8 From the information on the survey that was provided, I gather that the Bay Road
9 location was in an open field 200 yards south of the road midway between Blaine and
10 Kickerville Roads and that the Blaine Road location was also in a remote location on
11 the west side of Blaine Road. Since both of the positions are relatively far from any
12 local roads compared to the houses themselves, it is quite possible that the measured
13 levels do not adequately represent the noise levels due to local traffic that the
14 residences are actually exposed to.
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22 Although it concerns me that the ambient sound level may be lower than previously
23 measured at the nearest residences north of the project site, I'm not sure the one night
24 samples at these specific locations are sufficiently valid to warrant a complete
25 reassessment of the facility design.
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35 **Q. Why do your background measurements from last April provide a better basis**
36 **for the facility design?**
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38 A. First of all, I made simultaneous measurements at four locations (see Exhibit 24R.2)
39 representing all of the nearest residential areas and other sensitive receptors over a 60
40 hour period covering three consecutive nights. Statistically speaking, the much
41 longer duration and more numerous measurement locations make the survey results
42 more valid.
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3 More importantly, however, the long duration of the survey captured wind conditions
4 representing both of the prevalent conditions: one day and night at all locations with a
5 stable SSW wind; one day and night with a stable ENE wind; and one night of
6 variable winds (oscillating between the two prevailing directions). Although it,
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9
10 admittedly, tries to show a lot of information in a small space, Exhibit 24R.3 is a
11 consolidated plot of the L90(15 min) sound levels measured at all four locations
12 along with the hourly average wind speed and direction (measured at the refinery) as
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14
15 a function of time.
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21 The first 24 hours shows that under a southerly wind background sound levels at the
22 three Bay and Kickerville Road locations (Design Points 10, 11 and 14) are
23 remarkably similar at about 42 dBA. After the wind shifts to the NE around 5 p.m.
24 on 4/9 the sound levels at these same three locations drop into the high 30's (dBA). It
25 was under these wind conditions that the low levels in the 30's were measured in the
26 recent (November) survey. Note that the levels at each of these positions, which are
27 quite some distance from each other, are almost identical. This consistency is
28 indicative of a macro-ambient, which is to say the general background level is
29 controlled by very distant, indistinct sources and is essentially uniform over a large
30 area. This area would include both the Bay and Blaine Road measurement locations
31 adopted in the County survey.
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45 Since the general wind conditions on the second night of our survey were largely the
46 same as those during the entire County study one would expect similar levels. One
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1 possible explanation for the lower levels measured in this latter survey may be a
2 difference in microphone heights. For example, a microphone at, say, 2 or 3 ft.,
3 possibly in a field of tall grass, would be much more strongly affected by local
4 ground absorption than one at 7 or 8 ft., the height of our utility pole mounted
5 equipment. Essentially all relevant standards, such as ANSI S1.13-1995
6 *Measurement of Sound Pressure Levels in Air* recommend a minimum microphone
7 height of 1.2 to 1.5 m, or about 4 to 5 feet, above grade. The general intention is to
8 measure sound levels at the elevation they are perceived. In this instance, a height
9 roughly equal to a typical first floor window was considered appropriate. Although
10 requested, no information was provided on the microphone height used in November
11 survey. I have seen the County's Brüel & Kjær Type 2236 sound level meter set up
12 in the field during some joint measurements in July and, in that case, I recall the
13 microphone being placed roughly 3 feet above the ground.
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29 **Q. What about nighttime vs. daytime levels. Dr. Wierzba indicated that nighttime**
30 **levels should be used because that is when the likelihood of disturbance from a**
31 **new noise source is highest?**
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34 **A.** I agree with Dr. Wierzba. I can think of no other project in which I did not use the
35 nighttime L90 data as a design basis (nighttime is typically defined as 10:00 p.m. to
36 7:00 a.m.). However, the measurements I made in April had the very unusual
37 characteristic of being almost constant over the entire 60 hour survey period and
38 showed no consistent difference between daytime and nighttime hours. The levels
39 during two of the three nights, for instance, were indistinguishable from daytime
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1 levels; consequently, I determined that a universal average of all the L90 data was a
2 fair representation of the background level at each location.
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6 Now that I have taken a closer look at the wind conditions during that survey (Exhibit
7 24R.3); however, I would conclude that perhaps two sets of ambient levels, one for
8 each prevailing wind direction, might characterize the situation more accurately.
9 Specifically, the typical L90 levels during the first and third nights under a southerly
10 wind are in the 40 to 42 dBA range at the receptors to the north and east of the site,
11 and in the high 30's during the second night with an ENE wind. There's no clear
12 day-night or wind direction trend at the Jackson Road receptor (DP-7) and I would
13 suggest keeping to the 51 dBA value previously assumed. For illustrative purposes,
14 the following table summarizes a refined set of ambient values that may be somewhat
15 more appropriate than the original values I had developed in April.
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Receiver	Existing Nighttime Background During SSW Wind, dBA	Existing Nighttime Background During ENE Wind, dBA
Jackson Road, NW of site (DP-7)	51	51
Nearest residences on Blaine Rd. S. of Bay/Blaine intersection, N. of site (DP-10a)	42	38
Residences on Bay Road N. of site (DP-11)	40	37

Residences on Kickerville Rd.	40	38
E. of site (DP-14)		

Note that the values for the SSW wind condition are the same as the original values that had been derived from a generalized average of all the data.

By the way, as Dr. Wierzba has rightly pointed out, the DP-10 location at the intersection of Bay and Blaine Roads does not, as a modeling design point, represent several residences on Blaine Road that are closer to the facility. Accordingly, I have relocated the design point (now designated as DP-10a) to a location on Blaine Road some 1300 feet south the Bay/Blaine intersection. To minimize confusion and maintain consistency with the earlier work that had been performed by Golder Associates, I had decided to retain the locations and the location numbering scheme used in that assessment, even though the residences on Blaine Road were immediately obvious to me from aerial photographs even before my first site visit. The nominal project noise level is expected to be about 1 dBA higher at DP-10a vs. DP-10. Since such a difference is essentially intangible, I have not been overly concerned about significantly greater impacts at this location than at the houses beyond.

NOISE MODELING

1 **Q. Dr. Wierzba's testimony identifies concerns regarding the propagation**
2 **conditions, particularly the meteorological and ground conditions, used in the**
3 **model. Are his concerns regarding meteorological conditions justified?**
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6
7 A. No. A review of the historical atmospheric data collected at the Cherry Point refinery
8 during the five year period from 1995 to 2000 indicates that the site experiences a
9 prevailing ENE wind about half of the time (from roughly October to March) and a
10 SSW wind for remainder of the year. Seasonal wind roses are attached as Exhibit
11 24R.4.
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18 Moreover, temperature inversion conditions are not present 80 to 90% of the time
19 depending on season. By a large margin, the most common atmospheric stability
20 class is D, which can be considered "median". Median atmospheric conditions have
21 been assumed in my model.
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28 In addition, Dr. Wierzba's opinions regarding meteorological conditions are based on
29 data provided in Exhibit C to his testimony. The exhibit contains a percentile
30 analysis of the atmospheric conditions and wind directions that are assumed to be
31 prevalent at the site; however, the raw data comes from a weather station at Seattle-
32 Tacoma airport and dates from 1989 to 1992. Now, I am not a meteorologist but, as
33 I'm sure any resident of Whatcom County would agree, the wind and general weather
34 conditions in Birch Bay are probably significantly different than at SeaTac over a
35 hundred miles away, particularly the ENE component when the wind blows down
36 from Fraser Canyon (lacking in the SeaTac wind roses). Nevertheless, from this
37 assessment, Dr. Wierzba concludes that facility noise should be evaluated under
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1 strong temperature inversion conditions (atmospheric stability Class F) that favor
2 sound propagation and with a 6 to 7 mph wind from the SSW. Not only are these
3 conditions extremely conservative, but they are also completely unrealistic because a
4 Class F inversion only occurs concurrently with lower wind speeds (<5.6 mph on
5 clear nights and <3.4 mph on partly cloudy nights).
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12 These meteorological assumptions reflect a basic difference between my approach
13 and Dr. Wierzba's. I have used conservative but reasonable assumptions to model the
14 project noise under average conditions. Dr. Wierzba has combined several atypical
15 "worst-case" assumptions to model the noise under a scenario that is unlikely to ever
16 occur in the real world.
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24 **Q. What about his concerns about the ground conditions used in your model – are**
25 **they justified?**
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27
28 **A.** No. Ground absorption is an often under-rated attenuation mechanism. Very briefly,
29 the greater the porosity of the ground surface the more acoustic energy is dissipated
30 over a given distance. Since we've seen it make a dramatic impact on field
31 measurements on many occasions, we have determined it would be an outright
32 mistake to ignore it in design analyses. Water is a classic surface that has no porosity
33 and there is zero loss from ground absorption; i.e. the absorption coefficient is 0. At
34 the other end of the spectrum (coefficient of 1.0) plowed fields, grass fields and
35 woodlands normally have a very significant effect on sound propagation.
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1 In the model, I have assigned a reasonably conservative value of 0.5 to all of the
2 grasslands surrounding the site and a value of 1.0 to a few patches of woods. Now,
3
4 Dr. Wierzba has pointed out that at certain times of the year the fields north of
5
6 Grandview Road become wet and marsh-like to the point where hummocks of grass
7
8 are separated by mud or local areas of standing water. I was not previously aware of
9
10 this; however, after some consideration I don't believe my current assumptions on
11
12 ground effects are no longer valid.
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16 Firstly, I think the fundamentally conservative assumption of a 0.5 coefficient is
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18 adequate since my understanding is that the fields do not turn into lakes but rather can
19
20 still be considered grasslands with perhaps lower than normal absorption.
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23
24 More importantly, however, ground effects are driven by the ground surfaces close to
25
26 the source and close to the receiver and the middle ground is of only minor
27
28 importance. Near the plant the ground is expected to be a mixture of gravel (very
29
30 high absorption) and presumably drier grassland (south of Grandview). Near the
31
32 receptors on Bay Road, for instance, I would anticipate fairly dry grass fields behind
33
34 the houses. My understanding is that the seasonal marsh area is largely restricted to
35
36 the fields between Jackson and Blaine.
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41 **Q. Dr. Wierzba also itemizes certain concerns regarding the representation of the**
42
43 **facility used in the noise model. Are these concerns justified?**
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45 **A.** First, let me just say that I believe my comments thus far have, in a sense, already
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47 addressed these concerns. In general, his technical concerns imply that we have

1 made certain errors or assumptions that are causing us to underestimate facility noise,
2
3 whereas the main theme of what I've been saying is that our modeling is conservative
4
5 and that we have never had a plant miss its noise target because of any modeling
6
7 oversight. Additionally, I would add that the specific areas of concern he identifies
8
9 are extremely arcane in nature and would probably take much more time to explain to
10
11 a general audience than is warranted by the insignificance of many of these issues.
12
13 Consequently, I only intend to briefly touch upon a few of the simpler and/or more
14
15 meaningful concerns. If necessary, I would be happy to respond to questions about
16
17 any of the other concerns during my live testimony before the Council.
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20 21 K₀ Coefficient on Vertical Area Sources

22 Dr. Wierzba's testified that a K₀ factor of 3 was added to all vertical area sources and
23
24 that "it is uncertain as to why this was done". I added this factor to correctly model
25
26 vertical area sound sources. Let me explain.
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28

29
30 In the Cadna modeling software, various noise source types can be represented; most
31
32 commonly point sources, vertical area sources, and line sources. A point source
33
34 would be something like a relatively small piece of equipment such as a pump, a
35
36 stack exit, or a transformer. Noise from a hypothetical point source suspended high
37
38 in the air would radiate outwards in all directions and the wave front would be
39
40 spherical in shape. If the same source were lowered to an elevation of, say, 1 m
41
42 above the ground surface, its noise would then radiate outwards over a hemisphere.
43
44 Since the acoustical strength of the source is unchanged, all the energy that had
45
46 radiated downward now must also radiate upwards over the new hemispherical
47

1 pattern. In simple terms, the ground plane has the effect of doubling the strength of
2 the source and a sound level 3 dB higher would be measured at any given distance
3 from the source relative to the level that would have been measured at the same
4 distance from the suspended source radiating spherically. The ground plane in this
5 case constitutes a solid angle directivity coefficient, K_0 , of 3. Since industrial
6 facilities are not built high in the air, this factor of 3 dB representing the ground plane
7 is built into the program by default and it calculates the noise radiation from common
8 sources as if spreading over a hemispherical pattern.

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18 In the case of vertical area sources, such as walls or the sides of large boilers, this
19 default hemispherical radiation pattern is not realistic because now the space into
20 which the noise can radiate is bounded by both the ground and the vertical plane
21 through the source. A vertical area source radiates over a $\frac{1}{4}$ sphere and its effective
22 strength is again doubled, or increased by three. In the program, one must manually
23 add an additional K_0 factor of 3 to these sources to characterize them properly (as
24 radiating over a $\frac{1}{4}$ sphere) otherwise each of these sources will produce a level that is
25 3 dB too low at all far field points.

26 27 28 29 30 31 32 33 34 35 36 37 Load Compartment Discharges

38 Dr. Wierzba also testified that we failed to include the “load compartment
39 discharges” and that “on standard enclosures these sources have been listed at levels
40 as high as 112 dBA sound power”.

1 The load compartment is a small enclosure between the combustion turbine inlet
2 plenum and the generator that encloses the load shaft coupling. Exhibit 24R.5 shows
3 two views of a typical unit. The load compartment is the tan enclosure with a door in
4 the upper photo. The bottom photo is a close-up of the top of the enclosure showing
5 the ventilation system.
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12 First of all, there is only one discharge, the tan vent stack in the foreground of the
13 lower photo. Two fans (in the background) blow air into the enclosure through small
14 silencers and the exhaust air is forced out the vent, also on the roof of the enclosure,
15 through a silencer. In general, load compartments on these units are loud but it is not
16 because of the ventilation system. Using special scaffolding on a number of units at
17 different plants, I have carefully measured 1 inch from the fan intakes, fan housings,
18 fan motors, discharge silencer casing and silencer exit, and I can tell you the noise
19 levels are relatively low compared to the noise radiated from plenum/compartment
20 expansion joint, enclosure surfaces, doors, usually ill-fitting door seals and lube oil
21 pipe penetrations. The overall sound power level used in the model encompasses all
22 the sub-element noise sources associated with the total load compartment, including
23 the ventilation system, and represents its noise as a vertical area source on either side
24 of the compartment (with one half of the total power on each side).
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41 Furthermore, I am confused by Dr. Wierzba's statement that these sound power levels
42 for sources have been "listed." This information is not "listed" anywhere, at least not
43 in any tabulation that I would consider reliable. As I indicated, the inputs I used in
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1 my modeling are based upon actual measurements I've made at similar facilities. For
2 the most part, if I haven't measured it myself, it is not in the model.
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6 NOISE IMPACT ASSESSMENTS 7

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9 **Q. On Page 6 of his testimony, Dr. Wierzba includes a table depicting results from**
10 **his running of your model using modified sound propagation parameters from**
11 **which he concludes that noise impacts from the Cogeneration project will be**
12 **“very high” at some critical receptors, particularly to the north of the facility.**
13 **Do you agree with Dr. Wierzba’s conclusion?**
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18 **A.** No. Although I think the modifications Dr. Wierzba made to the noise model were
19 well intentioned, he employed assumptions and inputs that are unrealistic and that
20 made the model over-conservative in the extreme. I can confidently say that the high
21 impacts he is postulating will not materialize.
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28 First of all, as discussed above, the source levels that I originally used as inputs to the
29 model are based on actual sound level measurement taken at similar installations. I
30 am intentionally conservative when I develop sound power levels from field
31 measurements so as to preclude any possibility of underestimating the sound level of
32 the overall facility at any given receptor point.
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40 Secondly, Dr. Wierzba has effectively discounted many propagation losses that will
41 result in lower sound levels. What we have found time after time in field trials of
42 completed plants is that many so-called minor propagation losses, such as from
43 ground absorption, trees, and various other atmospheric effects (sometimes referred
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1 to as anomalous attenuation) are very real indeed. Rather than ignore these losses, I
2 have taken them into account, but only in a conservative way. As a result, it has
3 become a comfortable expectation on our part to measure significantly lower facility
4 noise levels at distant locations than are calculated by cautious modeling. In fact, no
5 plant we have designed has failed to meet its predicted performance due to any
6 erroneous modeling input or assumption, even under downwind or nighttime
7 inversion conditions, and many significantly undershoot the allowable level. It is this
8 experience that leads us to model facility noise under the median atmospheric
9 conditions (mild inversion, light downwind conditions) inherent in the ISO 9613
10 methodology.
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23 **Q. Can you provide any examples comparing measured levels to your modeled**
24 **predictions?**

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26 A. Yes. Let me just preface my response by saying that the majority of plants are
27 intentionally designed to produce noise levels that are largely indistinguishable from
28 the general ambient. As a result, it is a common situation in field trials to find that
29 the noise from the facility is, in fact, undetectable and lost below the prevailing
30 environmental sound level at the design points. It is not unusual to demonstrate
31 compliance with permissible facility noise levels by measuring a total level, i.e. plant
32 noise plus all concurrent off-site noise, that is less than or equal to what was
33 allowable from the facility alone. All that can be concluded with certainty in these
34 cases is that facility noise was substantially lower than the predicted value but no
35 specific value can be determined. In short, it takes involvement with a large number
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1 of projects before one comes along with the right physical surroundings and noise
2 requirements that permit its noise to be clearly evaluated relative to the design model.
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6 One such project with a favorable set of circumstances that is comparable to the
7 proposed Cherry Point facility was a combined cycle plant in Mexico with three GE
8 7FA units that I modeled and tested. What made this facility conducive to evaluation
9 was that it was located in a very remote area far from any major roads or other
10 sources of off-site noise. Consequently, plant noise could be directly measured
11 without contamination from background sources for a considerable distance in all
12 directions. Illustrations showing the original model predictions (Figure 1) measured
13 operational noise levels (Figure 2), and several informational photos are attached as
14 Exhibit 24R.6.
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26 The comparison between modeled and measured levels is shown in Figure 2 at a
27 number of representative points several hundred meters from the powerblock around
28 the site perimeter fence where a noise limitation of 65 dBA was applicable. At the
29 points of maximum exposure to plant noise, levels of 63 to 64 dBA were expected
30 from the model assuming median atmospheric conditions. Measurements over
31 several different days and times of day are shown in the sketch. Of particular note are
32 the measurement locations N and NE of the plant, which were directly downwind.
33 Even with this wind, the levels are 5 or 6 dBA below the modeled performance. In
34 other directions, under calm conditions, even larger over-estimates can be seen.
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1 Another example I can give is a combined cycle plant with two GE 7FA combustion
2 turbines in Oregon. In this instance, the facility had to meet the applicable State
3 noise limit of 50 dBA at a point roughly 600 m (1970 ft.) from plant. The photos in
4 Exhibit 24R.7 show a view from the receptor towards the plant and from the plant
5 towards the receptor. The modeled performance at this location was 48 dBA and the
6 measured level, after correcting for background noise as well as could be managed,
7 was determined to be 44 dBA under crosswind conditions. The noise from this plant
8 could not be measured above moderate background noise levels in the 40's at several
9 other locations at generally similar distances in other directions, including two
10 downwind locations.
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22 In general, the point I'm attempting to make with these examples is that field
23 experience has consistently shown us that an assumption of median atmospheric
24 conditions combined with the conservative model inputs we use normally yields a
25 predicted plant level with sufficient design margin to cover all but the most extreme
26 meteorological conditions.
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35 **Q. Dr. Wierzba recommends that noise increases resulting from the facility be**
36 **limited to 3 dBA, or at worst 5 dBA. What is your response to these**
37 **recommendations?**
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40 **A.** Dr. Wierzba's suggestion that noise emissions from the Cogeneration plant should be
41 limited by the level of noise increase above background is problematic. Such a limit
42 is based on cumulative increases; however, background sound levels are not a fixed
43 quantity but rather constantly vary over time. The County's own monitoring results
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1 show significant fluctuations in ambient noise at their chosen receptor locations. My
2 own monitoring showed the same. Thus, while noise from the facility will be
3 essentially constant during normal operation, the total cumulative noise level (the
4 sum of both the facility and off-site noise) will vary with the background noise
5 component. What this means is that the cumulative impact of facility noise is not a
6 fixed quantity because off-site noise is not controllable. Compliance is therefore very
7 difficult to measure. As a result, cumulative increases should be treated as valuable
8 design goals based on a conservative best estimate of certain existing ambient
9 conditions rather than absolute limitations that apply at all times.
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21 Furthermore, I disagree with Dr. Wierzba that a 3 dBA limitation is appropriate for an
22 industrial facility properly located in a Heavy Impact Industrial area. The
23 Washington State limit requires only that noise from the industrial facility be limited
24 to 70 dBA at industrial receivers and 50 dBA at residential receivers. The project has
25 already gone well beyond the regulatory requirement by designing the facility so that
26 no more than a maximum cumulative increase of 5 dBA to the existing sound level is
27 expected to occur. A 5 dBA increase is generally considered to be an acceptable
28 impact - although with careful listening some noise may be noticeable from the new
29 source.
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41 The nominal model predictions assuming median, downwind atmospheric conditions
42 are compared to the revised, wind dependent ambient levels (the mean L90 nighttime
43 level) in the following table.
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Receiver	Nominal Model Prediction, Plant Only, dBA	Existing Mean Nighttime Ambient SSW Wind, dBA	Cumulative Level, dBA	Incr., dBA		Existing Mean Nighttime Ambient ENE Wind, dBA	Cumulative Level, dBA	Incr., dBA
DP-7	40.3	51	51.4	0.4		51	51.4	0.4
DP-10a	40.7	42	44.4	2.4		38	42.6	4.6
DP-11	39.0	40	42.5	2.5		37	41.1	4.1
DP-14	43.1	40	44.8	4.8		38	44.3	6.3

Except for DP-14 under an ENE wind condition, all of the nominal predicted levels result in cumulative increases of less than 5 dBA. What is expected to actually happen; however, is that facility noise will be somewhat lower or, at worst, equal to the nominal value under a SSW wind at DP-10a and 11 and substantially lower at all other receptors during all wind conditions. In particular, the expected impact at DP-14 under an ENE wind, blowing essentially from the receptor towards the plant, is almost certainly going to be less than 6.3 and probably much less than 5 dBA.

Q. Why speculate on the ultimate performance? Why not just model the plant under the two prevailing wind conditions, for instance?

A. First of all, let me just clarify that wind and atmospheric effects can be calculated by the modeling program in accordance with several different, user-selectable standards

1 or methodologies; principally, ISO 9613 *Sound Propagation Outdoors* or Concawe.
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3 The 'Concawe' methodology is not a standard, per se, but rather a research paper on
4
5 sound propagation prepared for an organization of European oil companies of that
6
7 name.
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10 What we use is the default ISO 9613 assumption of a 3 m/s downwind condition at all
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12 receptor points. The alternative cases run by Dr. Wierzba employ the Concawe
13
14 algorithms.
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18 As I have said previously, our experience has been that the ISO downwind
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20 assumption yields satisfactory results in the field. The Concawe methodology, on the
21
22 other hand, generally predicts higher facility noise levels at downwind locations than
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24 we have come to expect; consequently, we typically do not use this option.
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28 If I were to apply the Concawe methodology and model the plant with an ENE wind,
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30 it would substantially depress the predicted plant level at DP-14 and eliminate the
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32 ostensibly unfavorable impact of more than 5 dBA in the table above; however, the
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34 predictions I would get at the receptors to the north of the facility would, in my
35
36 estimation, be too high under an assumed SSW wind.
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41 **Q. After considering Dr. Wierzba's testimony, do you still believe that the expected**
42
43 **cumulative increases to the existing ambient sound level from the project will be**
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45 **below 5 dBA?**

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47 **A. Yes. I still firmly believe that.**

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3 **Q. Can you comment on Dr. Wierzba's testimony regarding potential low**
4 **frequency noise impacts from the facility and his recommendation that low**
5 **frequency noise increases resulting from the facility be limited to 9 dBC, or at**
6 **worst 12 dBC?**
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11 A. As I have said before, based on my experience and measurements at other combined
12 cycle facilities, I have absolute confidence that there will not be any adverse impact
13 from low frequency noise. Dr. Wierzba readily concedes that low frequency
14 emissions from the facility will not be of concern if the A-weighted levels are lower
15 than he predicts. As I have explained above, Dr. Wierzba's predicted levels are
16 significantly over-inflated and noise emissions from the facility will be much lower
17 than he has predicted. Thus, by Dr. Wierzba's own estimation, low frequency noise
18 simply should not be a concern here. Imposing a limit on increases in low frequency
19 noise is therefore arbitrary and unjustified.
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31 **Q. Unless you have anything else to add, could you perhaps briefly summarize your**
32 **overall response to Dr. Wierzba's testimony?**
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35 A. Yes. I think that Dr. Wierzba's review of the noise impact assessment contained in
36 the Draft Environmental Impact Statement was very thorough, diligent and had many
37 valid points; however, the cumulative effect of his many revised assumptions
38 regarding the model and a total reliance on the questionable November ambient
39 survey results has, I believe, created a completely unrealistic picture of the probable
40 impact of the facility. While there is certainly nothing wrong with analyzing the
41 influence of wind and weather conditions on facility noise, Dr. Wierzba failed to
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1 account for the conservatism already inherent in the model and our track record in
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3 using it to successfully design many power plants.
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5 **END OF TESTIMONY**
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